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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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EXAMINER

CARRILLO, BIBI SHARIDAN

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/620,895 | SEHGAL, AKSHEY |
| | Examiner | Art Unit |
| | Sharidan Carrillo | 1746 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 16 July 2003.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-76 is/are pending in the application.
- 4a) Of the above claim(s) 46-76 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-45 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) 1-76 are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 16 July 2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11242003.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-45, drawn to a method of removing photoresist, classified in class 134, subclass 002.
 - II. Claims 46-76, drawn to a composition, classified in class 510, subclass 175.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case, the product as claimed can be used in a materially different process such as paint stripping.

2. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

3. During a telephone conversation with Ms. Kathleen Frost on 6/14/04 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-45. Affirmation of this election must be made by applicant in replying to this Office action. Claims 46-76 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-46 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a semiconductor substrate, does not reasonably provide enablement for any type of substrate. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims.

The claims embrace an invention which contains any known substrate, which could/can be selected from literally thousands. It does not appear to be feasible that any substrate would function in the present invention. Further, for one skilled in the art to reproduce the present invention (which must be possible, if the specification is adequate), there would clearly be undue experimentation to do so in an attempt to figure out which substrates work and which ones do not.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite because there is no positive step of removing the photoresist. The

step of exposing the substrate to the co-solvent mixture does not necessarily result in the removal of the photoresist from the substrate surface. Claim 7 is indefinite because dimethyl sulfoxide is not included in the Markush group of claim 3. Further, it is unclear whether the DMSO further defines the accelerator, as recited in claim 1 or whether applicant intends the co-solvent mixture to include the components carbonate, oxidizer, accelerator, and DMSO. If this is applicant's intent, then claim 7 should be amended to recite the co-solvent mixture further comprising DMSO. Claims 8 and 13 are indefinite for similar reasons to that of Claim 7. Once again it is unclear whether the benzyl alcohol or aqueous fluoride is further defining the accelerator. Claims 9-12 are indefinite for similar reasons. Claim 16 is indefinite because it is unclear whether the percentage is expressed in terms of volume or weight percent. Claims 34-35 are indefinite because "second co-solvent mixture" lacks positive antecedent basis. Claim 40 is indefinite because it is unclear what is meant by "high" dielectric constant gate material. Claim 42 is indefinite because "DUV" lacks positive antecedent basis. Claim 45 is indefinite because it is dependent on claim 1 which does not recite a supercritical fluid. It is unclear whether applicant needs to change the dependency to claim 2.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-7, 9, 13-14, 17-18, 20-24, 27, 29-32, and 45 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu et al. (US2003/0125225).

In reference to claims 1-7 and 9, Xu et al. teach removing photoresist by treating with a supercritical fluid in combination with a carbonate co-solvent, an oxidizing agent, and an accelerator (i.e. surfactant or chelating agent).

In reference to claims 13-14, refer to paragraph 29. In reference to claims 17-18, and 27, refer to paragraph 47. In reference to claim 20, refer to paragraph 46. In reference to claim 21, refer to paragraphs 11 and 46. In reference to claims 22-23, paragraph 47 teaches dithiocarbamate. In reference to claims 24, 29 and 30, refer to paragraph 45. In reference to claims 31-32, refer to paragraph 6.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (65005605) in view of Xu et al. (US 2003/0125225).

In reference to claims 1 and 45, Mullee et al. teach removing photoresist from a substrate using supercritical fluid in combination with an amine and solvent.

In reference to claim 1, Mullee et al. fail to teach an oxidizing agent. Xu et al. teach oxidizing agents for enhancing removal of photoresist. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include the addition of oxidizing agents, as taught by Xu et al., for purposes of enhancing photoresist removal . It is *prima facie* obvious to combine two compositions, each taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose (In re Kerkhoven, 205, USPQ 1069, 1072). In reference to claim 2, refer to the abstract of Mullee et al.

In reference to claims 3-4 and 9, Mullee et al. teach ethylene or propylene carbonate. Mullee et al. fail to teach butylene carbonate. Xu et al. teach conventional co-solvents include butylenes, ethylene, and propylene carbonate and mixtures thereof. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include homologs of equivalent carbonates, as taught by Xu et al., for purposes of performing the same function.

In reference to claims 5-7, refer to col. 4, lines 45-49 of Mullee et al. In reference to claims 13-14, refer to col. 9, lines 30-35. In reference to claims 17-18, refer to col. 4, lines 45-49. In reference to claims 20-21, refer to col. 6, lines 29-30.

In reference to claims 22, 27, and 29-30, Mullee et al. fail to teach the addition of a salt, glycol, or alcohol. Xu et al. teach chelating agents, alcohols (paragraphs 45, 47), for purposing of enhancing photoresist removal.

It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include alcohols and salts, as taught by Xu et al., for purposes of performing the same function.

In reference to claim 24, refer to col. 6, lines 21-41 of Mullee et al. In reference to claims 31-33, refer to the Abstract. In reference to claims 34-35, refer to col. 8, lines 9-27. In reference to claims 36 and 42, refer to col. 6, lines 11-15. In reference to claim 37, refer to col. 4, line 30-35. In reference to claim 38, refer to col. 2, line 50-52. In reference to claims 39-40 refer to col. 3 lines 30-45. In reference to claim 40 and in view of the indefiniteness as previously described, the limitations are met by Mullee et al. In reference to claim 43, it would have been obvious to a person of ordinary skill in the art to modify the method of Mullee et al. to include removal of post-ash residues since Mullee et al teach using the method for removal of residue from the substrate surface. In reference to claim 44, refer to col. 4, lines 30-37.

13. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 12 above, and further in view of Bhatt et al. (5637442).

Mullee et al. teach the invention substantially as claimed with the exception of benzyl alcohol. Bhatt et al. teach it is conventional to include organic solvents such as benzyl alcohol in combination with supercritical fluid for etching wafer surfaces. It would have been obvious to a

person of ordinary skill in the art to have modified the method of Mullee et al. to include benzyl alcohol, as taught by Bhatt et al., for purposes of performing the same function.

14. Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 12 above, and further in view of Marquis et al. (6040284).

Mullee et al. as modified by Xu et al. teach oxidizing agents, but fail to teach hydrogen peroxide. Marquis teaches strong oxidizing agents such as hydrogen peroxide, having a concentration of 30-50% for purposes of enhancing stripping of the substrate and miscibility with carbonate present in the composition. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include hydrogen peroxide having a concentration of 30-50%, as taught by Marquis et al., for purposes of enhancing the cleaning performance of the composition and to further improve the solvency of other components present in the composition mixture.

15. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 12 above, and further in view of Honda (6413923).

Mullee et al. teach the invention substantially as claimed with the exception of formic acid. Mullee et al. teach acetic acid. Honda teach formic and acetic as equivalent acids for removing residue from the wafer surface fluid for etching wafer surfaces. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to

substitute equivalent acids, such as formic acid, as taught by Honda et al., for purposes of performing the same function.

16. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 12 above, and further in view of Gotkis (6328042).

Mullee et al. teach the invention substantially as claimed with the exception of the limitations of claim 23. Gotkis teaches cleaning wafer surfaces using various types of solvents such as ammonium carbonate, the solvent being dependent on the type of contaminant present (col. 4, lines 10-30). It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to the addition of conventional solvents, such as ammonium carbonate, as taught by Gotkis, for purposes of performing the same function.

17. Claims 25, and 27-28 are is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 12 above, and further in view of Davenhall et al. (6403544).

Mullee et al. teach the invention substantially as claimed with the exception ether and propylene glycol. Davenhall et al. teach (col. 7, lines 55-65), the addition of additives such as propylene glycol methyl ether to the supercritical fluid for purposes of enhancing the cleaning process. It would have been obvious to a person of ordinary skill in the art to have modified the method of Mullee et al. to include additional additives, as taught by Davenhall et al., for purposes of enhancing the cleaning process.

18. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee et al. (6500605) in view of Xu et al. (US2003/0125225), as applied to claims 1-7, 9, 13-14, 17-18, 20-22, 24, 29-40, and 42-45 as described in paragraph 12 above, and further in view of DeYoung et al. (6669785).

Mullee et al. teach the invention substantially as claimed with the exception of the antireflective coating. DeYoung et al. teach that cleaning a substrate having an antireflective layer using a composition comprising a supercritical carbon dioxide in combination with co-solvents such as carbonates and an amine. It would have been obvious to have applied the method of Mullee et al. to cleaning of an antireflective layer since DeYoung et al. teach the using the same composition of Mullee et al. to clean photoresist, antireflective layers, ash residues and other contaminants from the wafer surface.

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Castrucci et al. teach glycol, IPA, methanol, and carbonate. Skee teaches ammonium carbonate. Cotte et al., Toma et al., Bhatt et al. Schilling, Mullee et al. teach SCF and cosolvents. Doscher teaches NMP and carbonate to remove photoresist. Lee teaches using photoresist with EDTA and glycol.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharidan Carrillo whose telephone number is 571-272-1297. The examiner can normally be reached on Monday-Friday, 6:00a.m-2:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy P. Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharidan Carrillo
Primary Examiner
Art Unit 1746

bsc



SHARIDAN CARRILLO
PRIMARY EXAMINER

A handwritten signature of "Sharidan Carrillo" is written in cursive ink above her printed name and title.